OIPE IAP53
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Attorney's Docket No. 1033539-000021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	
Ching Man Tsui et al.	Group Art Unit: 2829
Application No.: 10/829,431	Examiner: Russell Marc Kobert
Filed: April 22, 2004	Appeal No.: _____
For: APPARATUS AND METHOD FOR TESTING SEMICONDUCTOR DEVICES	

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal is from the decision of the Primary Examiner dated October 28, 2005, finally rejecting claims 1-5 and 8-13, which are reproduced as the Claims Appendix of this brief.

☐ A check covering the ☐ 250 ☐ 500 Government fee is filed herewith.

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The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

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I. Real Party in Interest

The subject application is assigned to ASM Assembly Automation Limited, of Hong Kong, China.

II. Related Appeals and Interferences

There are no other prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by, or have a bearing on the Board's decision in this appeal.

III. Status of Claims

The application contains claims 1-13, all of which are currently pending. Claims 6 and 7 have been identified as containing allowable subject matter. Claims 1-5 and 8-13 stand finally rejected, and form the basis for this appeal.

IV. Status of Amendments

There were no amendments filed subsequent to the final Office Action.

V. Summary of Claimed Subject Matter

The claimed subject matter is generally directed to the testing of semiconductor devices, and more particularly to an apparatus for supporting the devices during test operations. Although not limited thereto, the claimed apparatus is particularly suited for non-singulated semiconductor devices that are packed on a relatively thin leadframe. Because of its thin nature, such a leadframe is susceptible to buckling and potential damage during the testing procedure. The apparatus set forth in the appealed claims provides support for these types of leadframes, without the need to modify the semiconductor device packages, for example by trimming and bending the leads to enable them to contact a test head out of the plane of the leadframe. (Page 2, line 9 to page 3, line 18).

Figure 2 illustrates an embodiment of a leadframe carrier 2 comprising a main body 20 and a leadframe support member 21. The leadframe support member is formed with grooves 22 that are sized to receive non-singulated semiconductor devices that are formed with a leadframe. (Page 9, lines 3-21).

The grooves 22 are arranged on the support member 21 such that the leads extending from semiconductor devices within the grooves lie on a surface of the support member. In particular, the leads rest on the surfaces of the "islands" that are disposed between adjacent grooves, as well as the upper surface of the support member 21 adjacent the outer edge of the outermost grooves. This arrangement is depicted in Figure 16 of the application. The small rectangular boxes depict the ends of semiconductor devices 90 disposed within the grooves. The leadframes that extend horizontally from these devices rest on the upper surface of the support member 21. During testing, when pressure is applied to the leads by a test probe head, as represented by the downwardly pointing arrows, this pressure is counteracted by the leadframe support member on which the leads are resting, as illustrated by the upwardly directed arrows. Thus, the leads are not subject to deformation or damage during the testing process. (Page 13, lines 9-21).

Dependent claim 3 recites that the supporting apparatus includes a means for releasably gripping a leadframe, and dependent claim 5 recites a means for moving gripping members into and out of engagement with a leadframe. Referring to Figure 2, the carrier 2 includes leadframe gripping means 23. The structure of these gripping means is depicted in Figures 10 and 11 of the application. Each gripping means comprises a pair of gripping members 25 that are disposed on respective sides of the grooves. A spring 31 extends between the opposed gripping members, and moves them towards one another, to engage and hold a leadframe on the support member 21. To release the engagement, compressed air introduced through an inlet 60 acts upon a piston 64, to rotate the gripping members against the bias of the spring. (Page 9, line 22 to page 11, line 13).

VI. Grounds of Rejection to be Reviewed

The final Office Action presents a single ground of rejection for review on this appeal, namely whether claims 1-5 and 8-13 are unpatentable under 35 U.S.C. §102, in view of the Tsurishima et al patent (U.S. 5,227,717).

VII. Argument

Claims 1-5 and 8-13 stand finally rejected under 35 U.S.C. §102, as being anticipated by the Tsurishima et al patent. As set forth in MPEP §2131, "To anticipate a claim, the reference must teach *every* element of the claim." (emphasis added). For the reasons presented below, the Tsurishima et al patent does not teach every element of the rejected claims, and therefore does not anticipate them.

A. Claim 1

Claim 1 recites apparatus for supporting, during a testing operation, "a leadframe formed with at least one row of non-singulated semiconductor devices." The meaning of this terminology is explained in the background portion of the application, for instance at page 2, lines 9-16:

> When the dies are assembled into semiconductor packages, the packages are conventionally formed as part of what is called a leadframe. . . . When they are attached to the leadframe, the packages are electrically isolated from each other and are physically connected to the leadframe by one or more tie bars. In this condition, the devices are conventionally referred to as being non-singulated semiconductor devices.

Thus, in the non-singulated condition, the semiconductor packages are physically connected to one another via the leadframe.

The Tsurishima et al patent does not relate to the testing of a leadframe formed with at least one row of non-singulated semiconductor devices, as alleged in the final Office Action. Rather, it discloses the testing of *singulated* IC devices 44, i.e., individual devices that have been separated from one another. Referring to Figure 6, the Tsurishima et al patent discloses a test tray 24 that is designed to

accommodate a plurality of carrier modules 22. As shown in Figures 5A and 5B, each carrier module houses a single IC device 44.

There is no disclosure in the Tsurishima et al patent that the IC devices are mounted on a leadframe during the testing process. Rather, by the time they are inserted in the carrier module 22 for testing, the IC devices have been separated from the leadframe and their individual leads 46 have been bent to the appropriate shape, depicted in Figure 5B.

In rejecting the claims, the final Office Action refers to element 99 of the Tsurishima et al patent as a leadframe. While the patent describes this element as a "frame," it is not a leadframe as that term is commonly understood in the art. Rather, as shown in Figure 6, element 99 comprises one of the side frames that forms the tray 24. In contrast, a leadframe is defined as:

> The metal frame that semiconductors are attached to during the package assembly process. Typically a leadframe is a long metal frame with positions for multiple chips. After the chips are attached to the leadframe tiny wires are used to connect the chip bond pads to the frame and then the positions on the frame where chips are located are encapsulated in epoxy. After molding, the encapsulated chips are mechanically broken loose from the frame rails and the parts of the frame protruding from the package become the package leads. (HTTP://www.icknowledge.com/glossary/l.html)

In other words, the leadframe contains the metal components that eventually become the leads of the semiconductor package, hence the name.

In contrast to a leadframe, the chips are not electrically bonded to the side frames 99 that form the test trays 24 of the Tsurishima et al patent. Nor do these side frames form the leads that become part of the semiconductor package. Consequently, a person of ordinary skill in the art would not consider these side frames to constitute semiconductor device leadframes.

Claim 1 goes on to recite that the supporting apparatus comprises a main body and a leadframe support member. The leadframe support member is formed with at least one groove for receiving the semiconductor devices "such that in use leads extending from said devices lie on a surface of said support member." The Tsurishima et al patent discloses precisely the opposite. Referring to Figure 5B,

each semiconductor package 44 is received within a seat 100 of a carrier module 22. While the body 44 of the package is supported, the leads 46 extending therefrom are located within slits 102. As illustrated in Figure 7B, the leads do not lie on *any* surface. Rather, they are suspended in mid-air. This arrangement is designed so that a test contactor 103 can engage the leads 46 from below, through the slits 102, as shown in Figure 10B. (Column 9, lines 20-26).

For this additional reason, therefore, the Tsurishima et al patent does not anticipate the subject matter of claim 1. The tray 24 and the carrier 22 do not meet the recitation of a leadframe support member that is formed with at least one groove for receiving semiconductor devices such that, in use, "leads extending from the devices lie on a surface of the support member."

In responding to Appellants' arguments to this effect, the Advisory Action dated February 21, 2006 states "leads 46 of semiconductor ICs 44 are in contact with the surfaces of slits 102 to maintain fixed position of leads 46 for alignment of leads 46 during contact with test contactors 103 (shown in Figure 7B)." The Advisory Action seems to be suggesting that there might be incidental contact between the leads 46 and the side surfaces of the comb structure 158 that defines the slits 102. The fact that such incidental contact may occur is not sufficient to anticipate the recitations of the claim. Claim 1 does not merely recite that the leads extending from the devices "contact" a surface. Rather, it recites that the leads "lie on," i.e., rest upon, a surface of the support member. The basic objective of the structure shown in the Tsurishima et al patent is to *suspend* the leads 46 in mid-air, so that they can be contacted from below. Having the device leads 46 lie on a surface of the test tray 24 or carrier module 22 would defeat this objective. Thus, if anything, the Tsurishima et al patent teaches away from the claimed subject matter, rather than anticipating it.

B. Claim 3

Claim 3 recites that the apparatus of claim 1 further comprises means for releasably gripping a leadframe so as to hold the leadframe in place. In rejecting this claim, the Office Action refers to element 96 of the Tsurishima et al patent. This element is disclosed as a tapered rotor, and its structure can best be seen in Figure

4. As depicted therein, the tapered rotors 96 on either side of the test tray engage the side frame 99.

The tapered rotors 96 do not comprise a means on the support apparatus for releasably gripping a leadframe. First, as discussed previously, the side frame 99 of the test tray 24 is not a "leadframe," as that term is understood in the art. Thus, the tapered rotors do not perform the recited function.

Second, claim 3 recites that the support apparatus of claim 1 "further comprises" the gripping means, i.e. the gripping means is part of the structure of the support apparatus. The tapered rotors 96 of the Tsurishima patent do not form part of the support apparatus, e.g. the test tray 24. Rather, they are components of the testing system that are separate form the test tray, and function to transfer it from one station to the next.

C. Claim 5

Claim 5 indirectly depends from claim 3, and further recites means for moving the gripping members into and out of engagement with the leadframe. With respect to this claim, the final Office Action refers to the Tsurishima et al patent at column 9, line 67, to column 10, line 2. This portion of the patent discloses how the rotors 96 function to transfer the test tray from one stage of the testing operation to the next. There is no disclosure in this portion of the patent, or elsewhere, of a means for *moving* the rotors into and out of engagement with any structure, let alone a leadframe. Rather, as best as can be discerned, the tray guides 70, in which the tapered rotors 96 are mounted, maintain the same position relative to the test tray 24 throughout the testing process. There is no disclosure of *moving* the tapered rotors into and out of engagement with the test tray, or any structure supported thereon.

D. Claim 8

Claim 8 depends from claim 3, and recites that the gripping means extends through apertures formed in the leadframe support member. In rejecting this claim, the final Office Action states "note rotors 96 partially inserted to dashed line in frame 99." The Office Action appears to be referring to the fact that the tapered portions of

the rotors engage the indents within the side frames 99, as illustrated in Figure 4. This disclosure is not sufficient to anticipate the claim language. Claim 8 recites that the gripping means extends through *apertures* formed in the leadframe support member. The indents in the side frame 99 do not constitute apertures. Nor does the patent disclose that the tapered rotor extends *through* any structure. Rather, it only fits *into* the indents on the side frames.

E. Conclusion

For at least the foregoing reasons, the Tsurishima et al patent does not anticipate the subject matter of the rejected claims. First, it is not even directed to the testing of non-singulated semiconductor devices mounted on a leadframe. Second, the test tray and carrier modules of the Tsurishima et al patent do not have at least one groove that receives semiconductor devices such that, in use, leads extending from the devices lie on a surface of a leadframe support member. Further distinguishing features, recited in the dependent claims, are likewise not taught by the Tsurishima et al patent.

The rejection of claims 1-5 and 8-13 is not properly found in the statute, and should be reversed.

VIII. Claims Appendix

See attached Claims Appendix for a copy of the claims involved in the appeal.

IX. Evidence Appendix

(none)

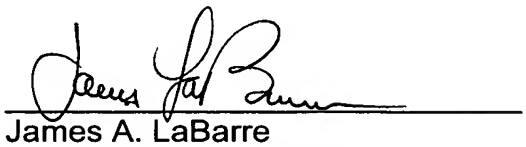
X. Related Proceedings Appendix

(none)

Respectfully submitted,

Buchanan Ingersoll PC

Date May 30, 2006

By: 

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VIII. CLAIMS APPENDIX

The Appealed Claims

1. Apparatus for supporting during a testing operation a leadframe formed with at least one row of non-singulated semiconductor devices, comprising a main body and a leadframe support member, wherein said leadframe support member is formed with a least one groove for receiving said semiconductor devices such that in use leads extending from said devices lie on a surface of said support member.

2. Apparatus as claimed in claim 1 wherein said leadframe support member is formed with a plurality of parallel grooves.

3. Apparatus as claimed in claim 1 further comprising means for releasably gripping a said leadframe so as to hold said leadframe in place.

4. Apparatus as claimed in claim 3 wherein said gripping means comprises a pair of gripping members disposed on respective sides of said groove.

5. Apparatus as claimed in claim 4 wherein means are provided for moving said gripping members into and out of engagement with a said leadframe.

8. Apparatus as claimed in claim 3 wherein said gripping means extends through apertures formed in said leadframe support member.

9. Apparatus as claimed in claim 1 wherein said main body is formed with locating pins for locating the leadframe support member on the main body.

10. Apparatus as claimed in claim 1 wherein said main body is formed of a conducting material and is provided with means for electrically grounding the main body.

11. Apparatus as claimed in claim 1 wherein the leadframe support member is formed of a high resistivity electrically insulating material.

12. Apparatus as claimed in claim 1 wherein said main body is provided with identification means.

13. Apparatus as claimed in claim 1 wherein said main body is formed with means for coupling said main body with a transport mechanism.